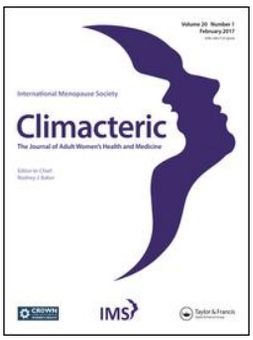

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ABSTRACT

Objectives: Around the menopause, sleep disturbances frequently occur or worsen and are associated with decreased health quality and physical and psychological problems. The aim of this study was to analyze sleep quality and its association with the impact of menopausal symptoms in Spanish postmenopausal women.

Methods: A total of 278 postmenopausal women (age 60.95 ± 8.01 years) participated in this cross-sectional study. The Medical Outcomes Study Sleep Scale (MOS-SS) and the Menopause Rating Scale (MRS) were used to analyze sleep quality and severity of menopausal symptoms, respectively. Anxiety and depression were measured using the Hospital Anxiety and Depression Scale.

Results: The linear regression showed that a greater impact of menopausal symptoms (MRS total score) was associated with worse scores regarding sleep adequacy ($p < 0.001$, $R^2 = 0.056$), snoring ($p = 0.020$, $R^2 = 0.036$), awaken short of breath ($p < 0.001$, $R^2 = 0.089$), and quantity of sleep ($p < 0.001$, $R^2 = 0.075$) domains. Anxiety ($p < 0.001$) and worse somatic symptoms ($p = 0.001$) were related to greater sleep disturbances ($R^2 = 0.164$). We also found relationships of heightened psychological symptoms ($p < 0.001$) and low physical activity level ($p = 0.003$) with increased daytime somnolence ($R^2 = 0.064$). Finally, higher MRS total score and anxiety levels were associated with worse sleep quality assessed by MOS-SS Sleep Problems Index I ($R^2 = 0.179$, $p < 0.001$ and $p = 0.001$, respectively) and Sleep Problems Index II ($R^2 = 0.146$, $p < 0.001$ and $p = 0.011$, respectively).

Conclusions: Anxiety and severity of menopausal symptoms were associated with poorer sleep quality. Furthermore, low physical activity level and worse psychological symptoms in menopause were predictors for increased somnolence. Therefore, screening for these factors in postmenopausal women is important, since they may be susceptible for intervention.

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Sleep quality; menopausal symptoms; quality of life; anxiety

Introduction

The prevalent lifestyle of current society is associated with several quality of life and health-related problems, among which we could mention sleep difficulties, reduced sleep time and quality, and excessive somnolence during the day[1]. About 25% of adults are not satisfied with their sleep and 10–15% have insomnia symptoms linked to negative daytime consequences[2]. Sleep disturbances in the elderly have been associated with short- and long-term consequences such as physical disability, memory loss, immune and metabolic disorders, and cardiovascular disease[3].

With the wide variety of sleep disturbances in mind, various instruments have been developed to evaluate sleep quality and its impact on daily life[4]. The design of a method to help manage sleep disturbances is hindered by the usually less-than-ideal communication between patients and therapists. The use of tools such as scales and questionnaires, when they have been properly developed and validated, may help improve this communication[5].

Although sleep disturbances are common in both genders and all age ranges, it has been found that women are between 1.3 and 1.6 times more likely to be affected[6]. Around the menopause, and secondary to hormonal changes, sleep disturbances frequently occur or worsen[7]. Studies dealing with the link between menopause and sleep quality have yielded contradictory results. It has been reported that menopause has no effect on quality of sleep[8], but perimenopausal and postmenopausal women have been shown to have more sleep-related problems than premenopausal women regardless of age[6].

Several factors have been shown to be related to impaired sleep quality, among which age, mood problems, hypertension, obesity, smoking, and low levels of physical activity can be mentioned[9–11]. Several of these factors are also common in women in postmenopausal status, and for this reason we believe looking into those that are commonly identified as menopausal symptoms may shed some light on the particulars of sleep quality in a postmenopausal population.

The aim of the present study was to analyze sleep quality in Spanish postmenopausal women and its association with the impact of menopausal symptoms. We hypothesize that a

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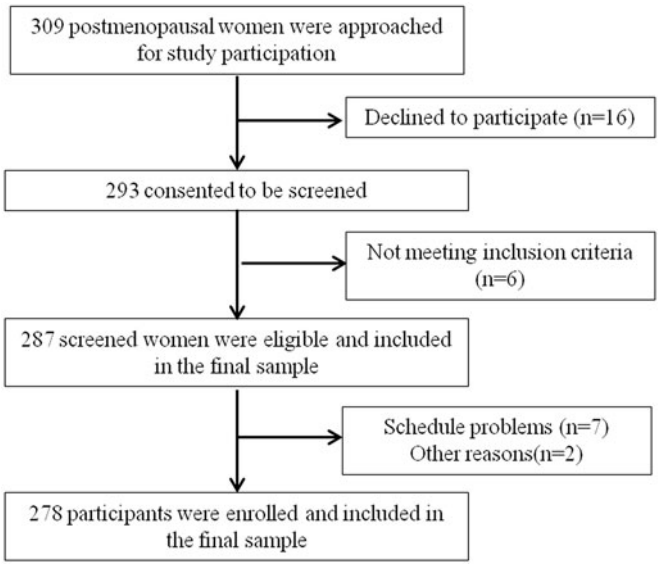

Figure 1. Flow chart of participants.

greater severity of menopausal symptoms is associated with worse sleep quality regardless of other associated factors.

Methods

Study design and participants

An analytical cross-sectional study was conducted from November 2016 to March 2017. A total of 309 women were recruited by contacting four cultural associations of postmenopausal women from Eastern Andalusia (Jaén and Granada). Participants were contacted by telephone calls, email, local media, and social networks. All subjects were given a leaflet with information concerning the study, and all signed an informed consent form prior to their participation. The research protocol was approved by the Research Ethics Committee of the University of Jaén, and developed according to the World Health Organization's ethical standards and procedures for research with human beings (Declaration of Helsinki).

Inclusion criteria were: 12 months of amenorrhea, being ambulatory, capable of completing the questionnaire, and willing to give written informed consent to participate in the study. Women on psychotropic medications, suffering from cancer or any other serious illness, subject to postmenopausal hormone therapy, or incapable of understanding the items included in the questionnaire were excluded from the study. Finally, 278 postmenopausal women took part in this study. A flow diagram of the participants is presented in Figure 1.

Outcomes

Demographic, anthropometric, and clinical data such as age, weight, height, marital status, academic education, years of menopause, and smoking habits were collected by well-trained interviewers. Participants who engaged in moderate-intensity physical exercise in a consistent fashion (over 30 min, three times a week) were categorized as physically active, according to the guidelines of the Centers for Disease Control and Prevention and the American College of Sports Medicine[12]. Nocturia was assessed according to the definition provided by the International Continence Society: patient-reported nocturnal voiding of one or more times per night[13]. Women on antihypertensive medication were considered hypertensive[14]. Weight was determined with a 100 g–130 kg precision digital weight scale (Tefal) and height was assessed using a T201-T4, Asimed adult height scale. Body mass index (BMI) was calculated by dividing the participant's weight (kg) by her height squared (m^2). BMI $<25\ kg/m^2$ indicates normal weight, 25–30 kg/m^2 shows overweight, and BMI $\geq 30\ kg/m^2$ is a sign of obesity[15].

The impact of menopausal symptoms on quality of life was estimated through the Menopause Rating Scale (MRS), which has been translated to more than 27 languages[16]. This is a menopause-specific health-related quality-of-life instrument that consists of 11 items grouped into three subscales: somatic (four items), psychological (four items), and urogenital (three items). Participants may grade each item as 0 (not present), 1 (mild), 2 (moderate), 3 (severe), and 4 (very severe). Values ≥ 17 (total score), ≥ 9 (somatic), ≥ 7 (psychological), and ≥ 4 (urogenital) indicate severe menopausal symptoms[17]. The presence and severity of hot flashes were assessed with item 1 of the MRS.

The Medical Outcomes Study Sleep Scale (MOS-SS), developed by Hays and Stewart[18], was employed to assess sleep quality. This questionnaire has been used in several studies involving postmenopausal women[19–21]. The Spanish version was used in the present study[22]. The MOS-SS evaluates sleep outcomes in the preceding 4 weeks and consists of 12 items: item 1, time to fall asleep; item 2, quantity of sleep/optimal sleep; item 3, sleep not quiet; item 4, enough sleep to feel rested; item 5, awaken short of breath or with headache; item 6, feel drowsy; item 7, trouble falling asleep; item 8, trouble back to sleep; item 9, trouble staying awake; item 10, snoring during sleep; item 11, take naps during the day; and item 12, get the right amount of sleep. The MOS-SS covers six different sleep domains or subscales: 'sleep disturbance' (items 1, 3, 7, and 8), 'daytime somnolence' (items 6, 9, and 11), 'sleep adequacy' (items 4 and 12), 'snoring' (item 10), 'awakening due to shortness of breath or with headache' (item 5), and 'quantity of sleep/optimal sleep' (item 2). Additionally, the scale also includes two indexes: the Sleep Problems Index I, which allows for the summary of sleep problems using an abbreviated six-item index (items 4, 5, 7, 8, 9, and 12); and the Sleep Problems Index II, which uses 9 of the 12 items in the scale to compute an overall sleep-problem summary (items 1, 3, 4, 5, 6, 7, 8, 9, and 12). Higher scores represent worse sleep problems.

In order to assess depression and anxiety we used the Hospital Anxiety and Depression Scale (HADS)[23], a self-administered rating scale that has been previously used in postmenopausal women[17]. This questionnaire includes 14 items, seven concerning anxiety and seven about depression. The total HADS scores range from 0 to 21 for both depression and anxiety. A total cut-off score of ≥ 11 on each

subscale was used to identify cases of anxiety and depressed mood. The Spanish version was employed in the present study[24].

Sample size calculation

For sample size calculation we required at least 20 observations per predicting variable included in the multiple linear regression model[25], as well as at least 10 subjects per event in the multiple logistic regression model[26]. Given that the linear regression model employed four possible predicting variables linked to the MRS (three subscales and the total score) in addition to nine covariables (anxiety, depression, age, BMI, hot flashes, hypertension, nocturia, smoking habit, and physical activity level), over 260 subjects were required for the purposes of our analysis. The final number of participants was 278.

Statistical analysis

Continuous variables were described using means and standard deviations, whereas categorical variables were described using frequencies and percentages. For evaluation of the normality of distribution, we used the Kolmogorov–Smirnov test. The MOSS-SS domains and sleep problems indexes were individually introduced as dependent variables. The MRS total score and subscales were input as independent variables, as well as other covariables such as anxiety, depression, age, BMI, nocturia, hot flashes, hypertension, smoking habit, and physical activity level. Since data were normally distributed, and in order to assess the possible associations or differences with sleep quality, Student's *t*-test (nocturia, hot flashes, hypertension, smoking habit, and physical activity level) and Pearson correlations (anxiety, depression, MRS total score and subscales, age, and BMI) were performed in an initial analysis.

In order to analyze the multivariate independent associations between predicting variables and the MOS-SS, we employed a multiple linear regression model. The two sleep problems indexes and the domains of MOS-SS were individually introduced as dependent variables in separate models. To explore the associations between variables in the linear regression model, we used only those variables which showed previous associations or differences in the bivariate correlation analysis and Student's *t*-test, respectively, in the adjusted analysis. We used a stepwise method for introducing variables into the model. The criterion for retaining one variable in both analyses was an *F*-statistic with $p \leq 0.05$, and the criterion for exclusion was $p \geq 0.10$. Adjusted R^2 was used to calculate the effect size coefficient of multiple determination in the linear models. According to Cohen, R^2 can be deemed insignificant when <0.02, small if between 0.02 and 0.15, medium if between 0.15 and 0.35, and large if >0.35[27]. The assumptions of the model were checked, particularly the potential collinearity when the value of the condition indexes was above 10[28]. A 95% confidence level was used ($p < 0.05$). Data management and analysis were carried out using the SPSS statistical package for the social sciences for Windows (SPSS Inc., Chicago, IL, USA).

Table 1. Descriptive data of the sample.

Characteristic	*Study sample (n = 278)*
Age, mean (SD) (years)	60.95 (8.01)
BMI, mean (SD)	28.04 (4.37)
Time since menopause, mean (SD) (years)	10.72 (8.51)
Smoker, *n* (%)	
No	243 (87.41)
Yes	35 (12.59)
Hot flashes, *n* (%)	
No	150 (53.96)
Yes	128 (46.04)
Hypertension, *n* (%)	
No	178 (64.03)
Yes	100 (35.97)
Nocturia, *n* (%)	
No	99 (35.61)
Yes	179 (64.39)
Physically active, *n* (%)	
No	123 (44.24)
Yes	155 (55.76)
HADS anxiety	6.53 (3.80)
HADS depression	4.56 (3.54)
MRS, mean (SD)	
Somatic subscale	4.61 (3.31)
Psychological subscale	4.13 (3.61)
Urogenital subscale	3.00 (2.94)
Total score	11.74 (8.06)
MOS-SS, mean (SD)	
Sleep disturbance domain	32.31 (24.67)
Daytime somnolence domain	26.74 (21.74)
Sleep adequacy domain	42.55 (29.51)
Snoring domain	36.19 (32.84)
Awaken short of breath or with headache domain	21.65 (28.31)
Quantity of sleep domain	6.54 (1.13)
Sleep Problems Index I (six items)	30.50 (19.33)
Sleep Problems Index II (nine items)	32.73 (20.18)

BMI, body mass index; HADS, Hospital Anxiety and Depression Scale; MRS, Menopause Rating Scale; MOS-SS, Medical Outcomes Study Sleep Scale; SD, standard deviation.

Results

A total of 278 women completed all examinations and questionnaires. Sociodemographic and clinical characteristics of the participants are presented in Table 1, with a mean age of 60.95 ± 8.01 years and a BMI 28.04 ± 4.37 kg/m^2 (overweight). Regarding weekly physical activity levels, 55.8% of the sample exercise less than 2.5 h/week.

In the present study, the most and least affected domains were sleep adequacy (42.55 ± 29.51) and quantity of sleep (6.54 ± 1.13), respectively. Regarding HADS scores, 38.40% of the women showed anxiety and 20.8% depression. As for the severity of menopause-related symptoms, 77 women (27.7%) displayed a severe general impact on their quality of life, with the urogenital MRS subscale being the most affected (38.1%).

The bivariate analysis (Table 2) showed that the MRS subscales and total score had correlations with MOS-SS sleep indexes and the domains of sleep disturbance, sleep adequacy, awaken short of breath or with headache, and quantity of sleep. Daytime somnolence correlated with the MRS total score and the somatic and psychological subscales, while snoring showed correlations with the MRS total score and the somatic and urogenital subscales. When we looked

Table 2. Pearson's correlations between the MOS-SS sleep problems indexes and subscales, the MRS domains and total score, anxiety and depression.

MOS-SS	*Anxiety*		*Depression*		*MRS somatic subscale*		*MRS psychological subscale*		*MRS urogenital subscale*		*MRS total score*		*Age*		*BMI*	
	r	p-Value	r	p-Value	r	p-Value	r	p-Value	r	p-Value	r	p-Value	r	p-Value	r	p-Value
Sleep disturbance	0.372	<0.001	0.188	0.002	0.339	<0.001	0.309	<0.001	0.169	0.005	0.339	<0.001	−0.032	0.593	0.044	0.470
Daytime somnolence	0.160	0.008	0.135	0.024	0.150	0.012	0.202	0.001	0.104	0.083	0.190	0.001	0.050	0.408	0.066	0.275
Sleep adequacy	0.196	0.001	0.078	0.193	0.224	<0.001	0.199	0.001	0.173	0.004	0.244	<0.001	0.072	0.232	−0.069	0.250
Snoring	0.111	0.064	0.041	0.492	0.142	0.017	0.101	0.093	0.141	0.019	0.155	0.010	−0.039	0.518	0.076	0.209
Awaken short of breath or with headache	0.248	<0.001	0.095	0.116	0.258	<0.001	0.270	<0.001	0.211	<0.001	0.304	<0.001	−0.062	0.303	0.102	0.090
Quantity of sleep	−0.245	<0.001	−0.182	0.002	−0.268	<0.001	−0.257	<0.001	−0.148	0.014	−0.280	<0.001	0.050	0.404	0.059	0.328
Sleep Problems Index I (six items)	0.330	<0.001	0.154	0.002	0.336	<0.001	0.322	<0.001	0.222	<0.001	0.364	<0.001	−0.008	0.776	0.010	0.505
Sleep Problems Index II (nine items)	0.374	<0.001	0.185	0.010	0.367	<0.001	0.352	<0.001	0.230	<0.001	0.392	<0.001	−0.017	0.889	0.040	0.868

MOS-SS, Medical Outcomes Study Sleep Scale; MRS, Menopause Rating Scale; BMI, body mass index; *r*, Pearson correlation coefficient.

into the associations of MOS-SS with HADS, anxiety and depression correlated with both MOS-SS sleep problem indexes and with the domains of sleep disturbance, daytime somnolence, and quantity of sleep. Moreover, anxiety also correlated with the MOS-SS domains of awaken short of breath or with headache and sleep adequacy. There were no correlations between MOS-SS and age or BMI.

The initial analysis of potential dichotomous variables did not reveal any individual association between hot flashes, hypertension, nocturia, or smoking habits and sleep quality (data not shown). Differences regarding the MOS-SS questionnaire were observed only for weekly physical activity, with physically active participants exhibiting lower levels of daytime somnolence ($p = 0.002$) and reporting to have better sleep adequacy ($p = 0.049$) than those who reported to be physically inactive.

Lastly, the multivariate linear regression analysis (Table 3) revealed that the increased somatic impact of menopausal symptoms ($p = 0.001$) and heightened anxiety were associated with worsened sleep quality in the MOS-SS sleep disturbance subscale. After the multivariate analysis, only the MRS total score appeared to be associated with the MOS-SS subscales of sleep adequacy ($p < 0.001$), snoring ($p = 0.020$), awaken short of breath or with headache ($p < 0.001$), and quantity of sleep ($p < 0.001$).

To continue with the multivariate analysis (Table 3), a deeper psychological impact of menopausal symptoms ($p < 0.001$) and low levels of physical activity ($p = 0.003$) were associated with increased daytime somnolence. Finally, both heightened anxiety and a greater overall impact of menopausal symptoms (MRS total score) were the only ones to be associated with a higher score (worse sleep quality) of the nine-item ($p = 0.001$ and $p < 0.001$, respectively) and the six-item ($p = 0.011$ and $p < 0.001$, respectively) sleep problems indexes. The effect size was small for the MOS-SS Sleep Problems Index II (nine items) and its subscales of sleep adequacy, snoring, awaken short of breath or with headache, and quantity of sleep, while a medium effect size was found for the MOS-SS Sleep Problems Index I (six items). Regarding sleep disturbance, the effect size was medium for the associations of anxiety and the somatic subscale of the MRS with the sleep disturbance subscale (Table 3).

Discussion

The findings of the present study show that there is a positive association between sleep disturbances, anxiety level, and the severity of menopause symptoms. Moreover, a relationship between low physical activity level, greater psychological impact of menopausal symptoms, and increased somnolence was observed. These findings suggest these risk factors could be implemented in clinical practice and may lead to feasible cost-effective interventions.

Regarding the association between sleep quality and the impact of menopausal symptoms, it has been recently suggested that menopause in itself does not worsen sleep quality[8], and that the cause of poor sleep quality among women at that stage is still to be identified. Blümel *et al.*[29] reported

Table 3. Multivariate linear regression analyses for factors associated with sleep quality assessed by the MOS-SS.

MOS-SS	B	β	*95% CI*	R *multiple*	R^2	*Adjusted* R^2	p-*Value*
Sleep disturbance							
Anxiety	1.757	0.270	0.948, 2.566	0.372	0.138	0.135	<0.001
Somatic subscale (MRS)	1.526	0.205	0.598, 2.454	0.412	0.170	0.164	0.001
Daytime somnolence							
Psychological subscale (MRS)	1.295	0.215	0.605, 1.985	0.202	0.041	0.037	0.001
Physical activity level	−7.653	−0.175	−12.666, −2.640	0.267	0.071	0.064	0.003
Sleep adequacy							
MRS total score	0.894	0.244	0.473, 1.314	0.244	0.060	0.056	<0.001
Snoring							
MRS total score	0.567	0.139	0.091, 1.044	0.208	0.043	0.036	0.020
Awaken short of breath or with headache							
MRS total score	1.067	0.304	0.671, 1.464	0.304	0.092	0.089	<0.001
Quantity of sleep							
MRS total score	−0.039	−0.280	−0.055, −0.023	0.280	0.078	0.075	<0.001
Sleep Problems Index I (six items)							
MRS total score	0.649	0.259	0.309, 0.989	0.392	0.154	0.151	<0.001
Anxiety	0.938	0.177	0.218, 1.659	0.430	0.185	0.179	0.001
Sleep Problems Index II (nine items)							
MRS total score	0.632	0.263	0.313, 0950	0.364	0.132	0.129	<0.001
Anxiety	1.110	0.218	0.433, 1.786	0.391	0.153	0.146	0.011

B, unstandardized coefficient; *β*, standardized coefficient; CI, confidence interval; MRS, Menopause Rating Scale; MOS-SS, Medical Outcomes Study Sleep Scale; *R*, Pearson correlation coefficient.

that a severe impact of the menopause on quality of life was shown to be associated with insomnia and worsened sleep quality, although their regression analysis did not reveal any relationships. Nevertheless, Monterrosa-Castro *et al.*[30] reported associations of the psychological and somatic MRS domains and worsened sleep quality, and Cuadros *et al.*[31] described positive correlations between the MRS total score and subscales and insomnia. A recent study showed that poor sleep early in menopause is not correlated with poor sleep later in menopause[32]. All of these studies were performed in premenopausal and perimenopausal women. The Sleep in Midlife Women Study found that progression through the menopausal transition was associated with increasing severity of sleep disordered breathing[33]. Our multivariate analysis showed that a higher global impact of menopause-related symptoms was associated with worsened sleep quality in four MOS-SS subscales (snoring, sleep adequacy, short of breath or with headache, and quantity of sleep), as well as with overall poorer sleep quality as assessed by both MOS-SS sleep problems indexes. More specifically, we found that the psychological and somatic subscales of MRS were associated with higher daytime somnolence and sleep disturbances, respectively. In our analysis, all of the associations between the impact of menopausal symptoms and sleep quality have been obtained after taking into account several covariates such as age, anxiety, and depression or vasomotor symptoms.

The MRS includes one item regarding sleep problems that partially contributes to the somatic subscale score and MRS total score. However, our results showed significant bivariate correlations between the different MOS-SS domains and all of the MRS subscales. In the multiple regression analysis, the MRS total score remained an independent predictor on most of the occasions, but given the contribution of this particular item to the MRS total score, we consider that it may not be responsible for the significant correlations observed. Despite sleep problems being common place among women in the perimenopause and postmenopause[34], the etiology of menopausal sleep problems is multifactorial, and the association between sleep problems and estrogen decline, vasomotor symptoms, or the aging process remains unclear[35]. Although vasomotor symptoms[36] or hypertension[30] have been associated with increased frequency of night-time awakenings and poorer sleep quality in postmenopausal women, other authors such as Terauchi *et al.*[37] recently reported that insomnia is more closely associated with psychological than somatic symptoms among perimenopausal and postmenopausal female patients in a clinical setting. Our initial analysis showed no differences in sleep quality according to the presence or absence of hot flashes, nocturia, or hypertension, which is why these were not included in the multivariate regression analysis, although a possible explanation for these results may rely on the fact that women who were undergoing antihypertensive treatment were considered hypertensive.

With regards to other factors that have been linked to increased sleep problems, such as higher BMI and smoking[30], we did not find any associations and thus these were also excluded from the final regression model, hence suggesting that they may have little or no effect on sleep quality in postmenopausal women, which is in accordance with other studies[38,39]. Sedentary lifestyle has been associated with insomnia in postmenopausal women[40], whereas other studies failed to demonstrate differences between women with high and low physical activity levels[41]. Our results showed that a low level of weekly physical activity was associated with greater somnolence, which is in accordance with the results described by Chedraui *et al.*[42]. Excessive daytime somnolence is associated with difficulties in performing daily-life activities, irritability, mood alterations, memory problems, and even with increased mortality linked to cardiovascular conditions[43]. For this reason, physical activity should be considered an essential factor in the management of sleep problems in postmenopausal women.

Finally, as for mood problems, it has been reported that anxiety and depression are more prevalent among middle-

aged women[17]. These mood alterations have been associated with estradiol fluctuations, and the menopause-related hormonal changes are strongly linked to depression in women with no previous history[44]. Mood symptoms have been shown to be strongly related to sleep disturbances regardless of other factors such as vasomotor symptoms among postmenopausal women[45], and Blümel *et al.*[29] reported that both anxiety and depression are independent factors related to sleep disturbances. Our analysis demonstrated that heightened anxiety may be a predictor for worsened sleep quality, but the same was not true for depression. These findings are in accordance with those of Cheng *et al.*[46], who stated that anxiety but not depression (HADS) was linked to most insomnia symptoms, based on the criteria for insomnia of the *Diagnostic and Statistical Manual of Mental Disorders*, among women aged 43–57 years.

Some limitations of this study should be noted in the interpretation of results. Objective polysomnographic or actigraphic evidence of a sleep disorder was not assessed in the present study and menopause status was determined only by the presence of 12 months of amenorrhea, but no follicle stimulating hormone measurements were performed and other causes of amenorrhea were not investigated (i.e. hormonal intrauterine device). Furthermore, our research was conducted on women from a specific geographical area, and any generalization of its results should be limited to individuals with similar characteristics to those of our sample population. In addition, the transversal nature of our design does not allow for causal relations to be established between sleep quality and mood, or between the impact of menopausal symptoms and quality of life. Future studies should explore prospective designs for a larger and more diverse population, using objective means to assess menopause and sleep quality.

In conclusion, our results suggest that the increased overall severity of menopausal symptoms is associated with worsened sleep quality among Spanish postmenopausal women, whereas somatic and psychological symptoms are linked to sleep disturbances and daytime somnolence, respectively. In addition, we found an association between higher anxiety levels and increased sleep disturbances and poor overall sleep quality, as well as between lower physical activity levels and daytime somnolence. For this reason, the impact of menopausal symptoms, anxiety, and physical activity levels should be taken into account in the management of sleep disturbances in postmenopausal women.

Potential conflict of interest The authors claim to have no conflict of interest.

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